WHAT IS CLAIMED IS:

Claim 1. A non-extractive optical particulate monitor for measuring particulate matter entrained in a flow within a flow structure, the monitor comprising:

a light emission system located adjacent to and placeable in optical communication with the flow structure and including a light source positioned to project a beam of light into the flow structure, wherein the beam of light is scattered by particulate matter;

a light detection system having a detector and located adjacent to and placeable in optical communication with the flow structure and positioned in a lateral relationship with the light emission system for receiving a desired portion of the light scattered by the particulate matter; and

a calibration system including a calibration shutter located between the light emission system and the light detection system and remote from the flow structure to selectively admit light from the light emission system to enter the light detection system for calibration of the monitor without traveling through the flow structure.

Claim 2. The monitor of claim 1, further comprising one or more shutters adjacent the flow structure and operable to selectively block optical communication between the light emission system and the flow structure and optical communication between the light detection system and the flow structure so as to provide a barrier to

the travel of light from the light emission system into the flow structure and a barrier to the travel of light from the flow structure to the light detection system.

Claim 3. The monitor of claim 1, wherein the light emission system further comprises a lens associated with the light source for acting on light received from the light source to yield a collimated beam of light.

Claim 4. The monitor of claim 1, wherein the light detection system further comprises a collector lens for directing scattered light toward the detector.

Claim 5. The monitor of claim 1, wherein the calibration shutter comprises a rotary shutter and the calibration system further comprises beam splitter and a mirror operatively associated with the light source of the light emission system and positioned adjacent a first end of the calibration shutter for directing light toward the calibration shutter.

Claim 6. The monitor of claim 5, wherein the light detection system further includes a collector lens having principal planes and the calibration system further includes a lens for directing light emitted from the calibration shutter in a plane approximately parallel to the principal planes of the collector lens.

Claim 7. The monitor of claim 1, further comprising a first aperture adjacent the light emission system for providing an optical communication path between the light emission system and the flow structure and a second aperture adjacent the light detection system for providing an optical communication path between the light detection system and the flow structure.

Claim 8. The monitor of claim 7, further comprising a first shutter adjacent the first aperture and operable to selectively close the first aperture and provide a barrier to the travel of light from the light emission system into the flow structure and a second shutter adjacent the second aperture and operable to selectively close the second aperture and provide a barrier to the travel of light from the flow structure to the light detection system.

Claim 9. The monitor of claim 1, wherein the calibration system is operable to provide a zero point calibration under conditions wherein substantially no light rom the light emission system enters the light detection system, and a span point calibration wherein light from the light emission system is directed to the light detection system without traveling through the flow structure.

Claim 10. A non-extractive optical particulate monitor for measuring particulate matter entrained in a flow within a flow conduit, the monitor comprising a

light emission system which projects a beam of light into the flow conduit, wherein such light is scattered by the particulate matter, a light detection system positioned in a non co-linear relationship with the light emission system to receive and detect light scattered by the particulate matter in the flow conduit, and a calibration system located between the light emission system and the light detection to selectively enable light from the light emission system access to the light detection system without traveling through the flow structure for calibration of the monitor.

Claim 11. The monitor of clam 10, wherein the light emission system comprises a light source and a collimator lens adjacent the light source for projecting a collimated beam of light into the flow conduit.

Claim 12. The monitor of claim 10, wherein the light emission system is mounted external to the flow conduit and the flow conduit includes a light emission aperture for permitting light from the light detection system to enter the flow conduit.

Claim 13. The monitor of claim 12, further comprising a shutter adjacent the light emission aperture to block the travel of light from the light emission system into the flow conduit.

Claim 14. The monitor of clam 10, wherein the light detection system comprises a collector lens and a detector adjacent the collector lens.

Claim 15. The monitor of claim 10, wherein the light detection system is mounted external to the flow conduit and the flow conduit includes a light detection aperture for permitting light from the flow conduit to enter the light detection system.

Claim 16. The monitor of claim 15, further comprising a shutter adjacent the light detection aperture to block the travel of light from the flow conduit into the light emission system.

Claim 17. The monitor of claim 10, wherein the calibration system includes a beam splitter and a mirror operatively associated with the light emission system for generating a calibration light beam, and a rotary shutter system located between the light emission system and the light detection system for selectively transmitting the calibration light beam or a desired portion thereof to the light detection system.

Claim 18. The monitor of claim 17, wherein the light detection system further includes a collector lens having principal planes and the rotary shutter system comprises a rotary shutter and a lens adjacent the rotary shutter for directing light

emitted from the rotary shutter in a plane generally parallel to the principal planes of the collector lens.

Claim 19. The monitor of claim 10, wherein the calibration system is operable to provide a zero point calibration under conditions wherein substantially no light rom the light emission system enters the light detection system, and a span point calibration wherein light from the light emission system is directed to the light detection system without traveling through the flow structure.

Claim 20. A system for measuring particulate matter, the system comprising:

a flow structure for receiving a flow therein containing particulate matter;

a first aperture for emitting light into the flow structure and a second aperture for enabling light to travel from the flow structure;

a light emission system located external to the flow structure and including a light source and an associated collimator lens positioned to project a beam of light into the flow structure through the first aperture, wherein the beam of light is scattered by the particulate matter;

a light detection system located adjacent the second aperture and external to the flow structure in a lateral relationship with the light emission system, the

light detection system including a detector and a collector lens having principal planes; and

a calibration system comprising a beam splitter, a mirror operatively associated with the light emission system for generating a calibration light beam, and a rotary shutter system located between the light emission system and the light detection system for selectively transmitting the calibration light beam or a desired portion thereof to the light detection system, the rotary shutter system including a rotary shutter for directing light in a plane generally parallel to the principal planes of the collector lens.

Claim 21. The monitor of claim 20, further comprising a photosensitive detector operatively associated with the rotary shutter for receiving an optical signal proportional to the beam of light from the light source when the rotary shutter is oriented to fully restrict the passage of light therethrough.

Claim 22. The monitor of claim 20, wherein the light detection system is pivotally movable about a point so that its position may be adjusted.

Claim 23. The monitor of claim 20, wherein the detector includes an optical bandwidth filter.

Claim 24. The monitor of claim 20, further comprising a purge air system having an inlet for introducing air into the monitor and an outlet for exhausting air from the monitor to the flow conduit.

Claim 25. A method for checking operating conditions of an optical monitor configured for monitoring particulate matter in a flow conduit, comprising the steps of providing an optical monitor having a light source and a light detection system, with the light detection system including a collector lens having principal planes; directing light from the light source to the light detection system via a path that does not travel through the flow conduit and which is directed in a plane generally parallel to the principal planes of the collector lens to yield information corresponding to the cleanliness of the collector lens.